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(54) **DISPOSABLE MINI-APPLICATIONS**

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See application file for complete search history.

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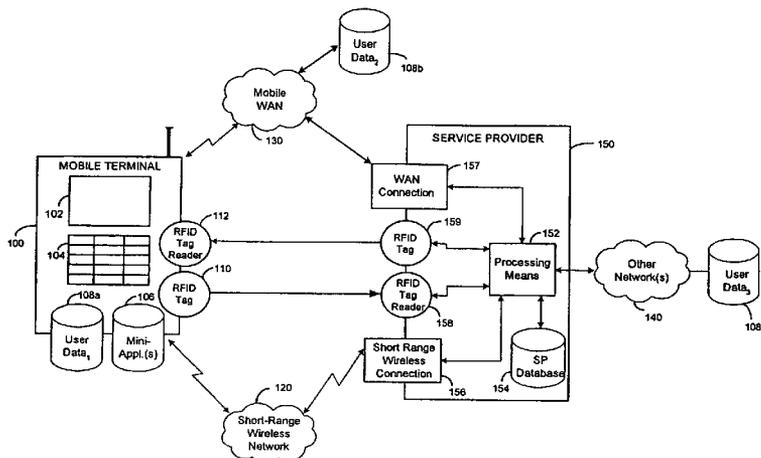
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(57) **ABSTRACT**

Disposable mini-applications are executable software items whose activation, deactivation and deletion in a mobile terminal are defined by trigger parameters and rules. Trigger parameters may include, but are not intended to be limited to, location, time, stored user data and the like. Rules are one or more trigger parameters needed to effect one of the foregoing actions. In one embodiment, a housekeeping means monitors for data that corresponds to the parameters and satisfies the rules, and performs a variety of housekeeping functions relating to the disposable mini-applications. The deletion of the disposable mini-application clears memory space associated with storing and executing the disposable mini-application, and thus, makes that space available for other purposes.

57 Claims, 6 Drawing Sheets



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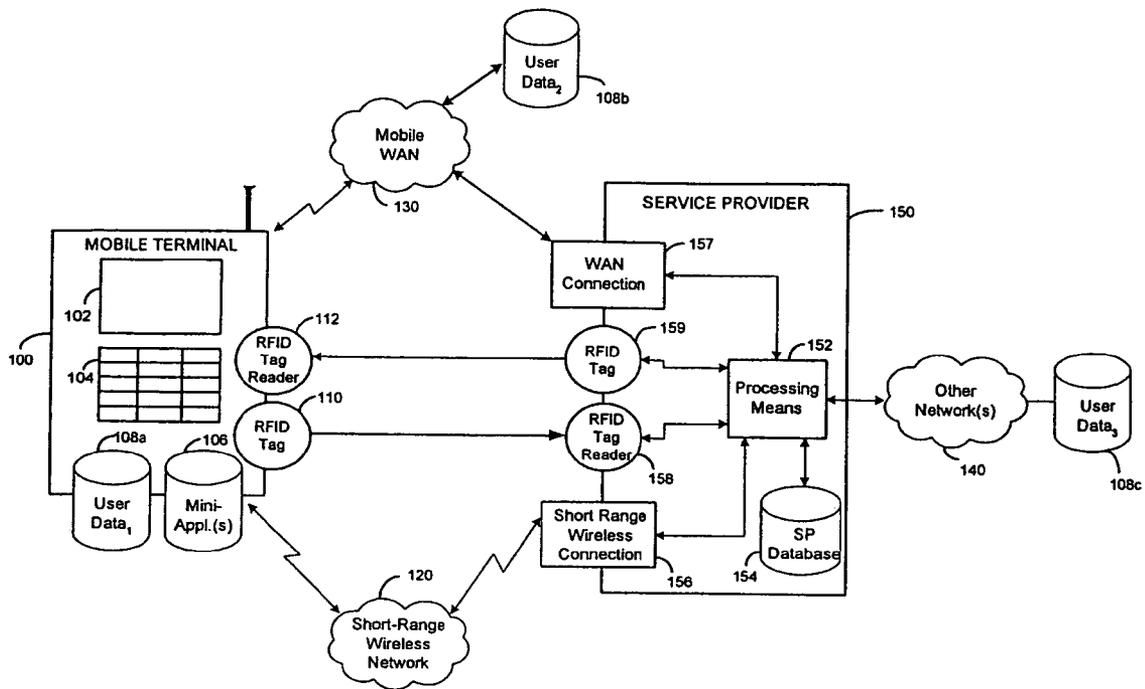


FIG. 1

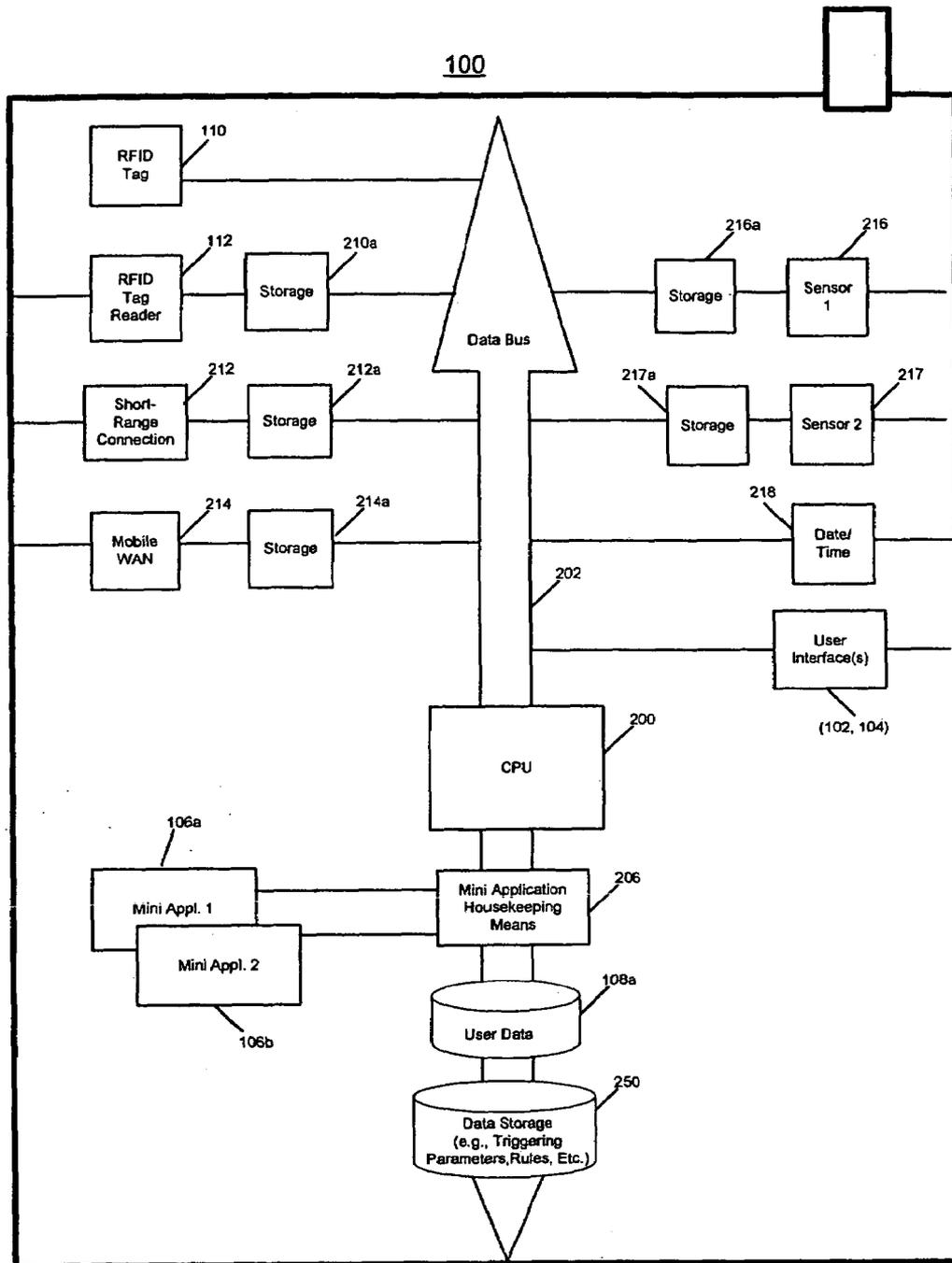


FIG. 2

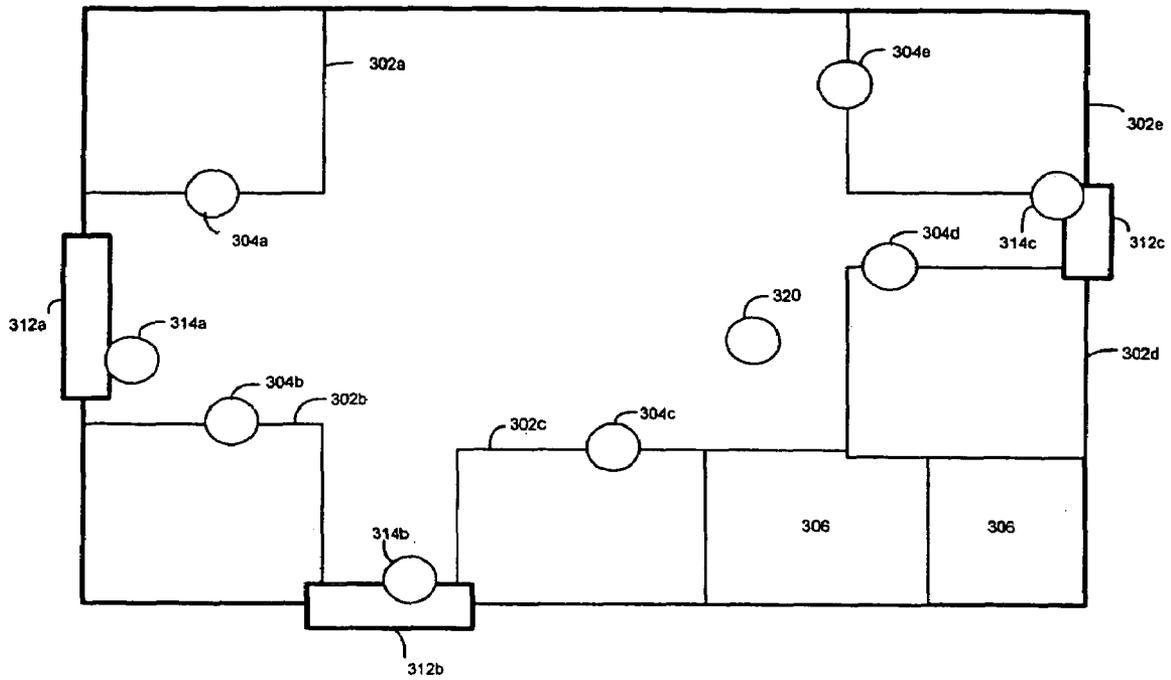


FIG. 3

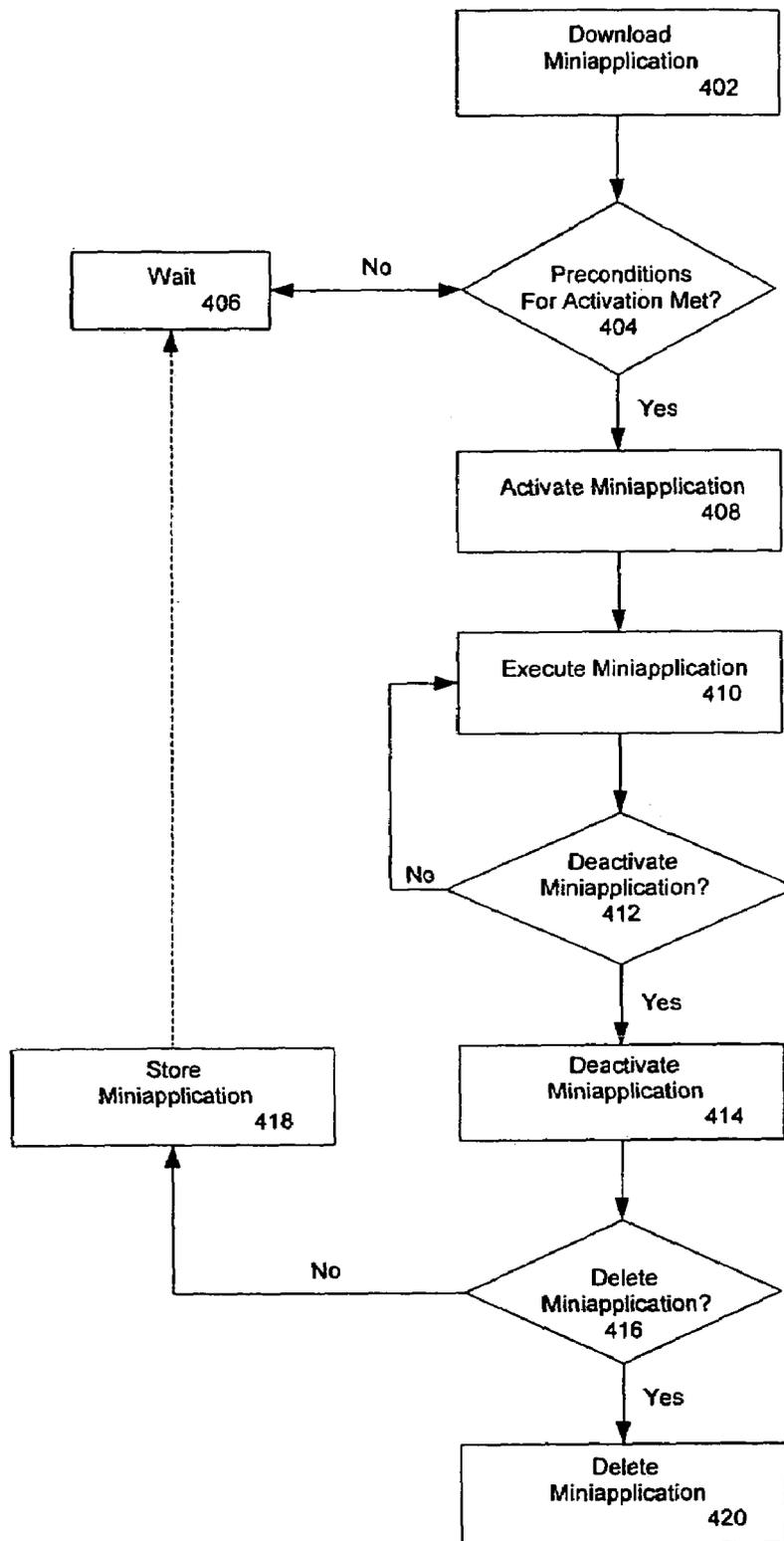


FIG. 4

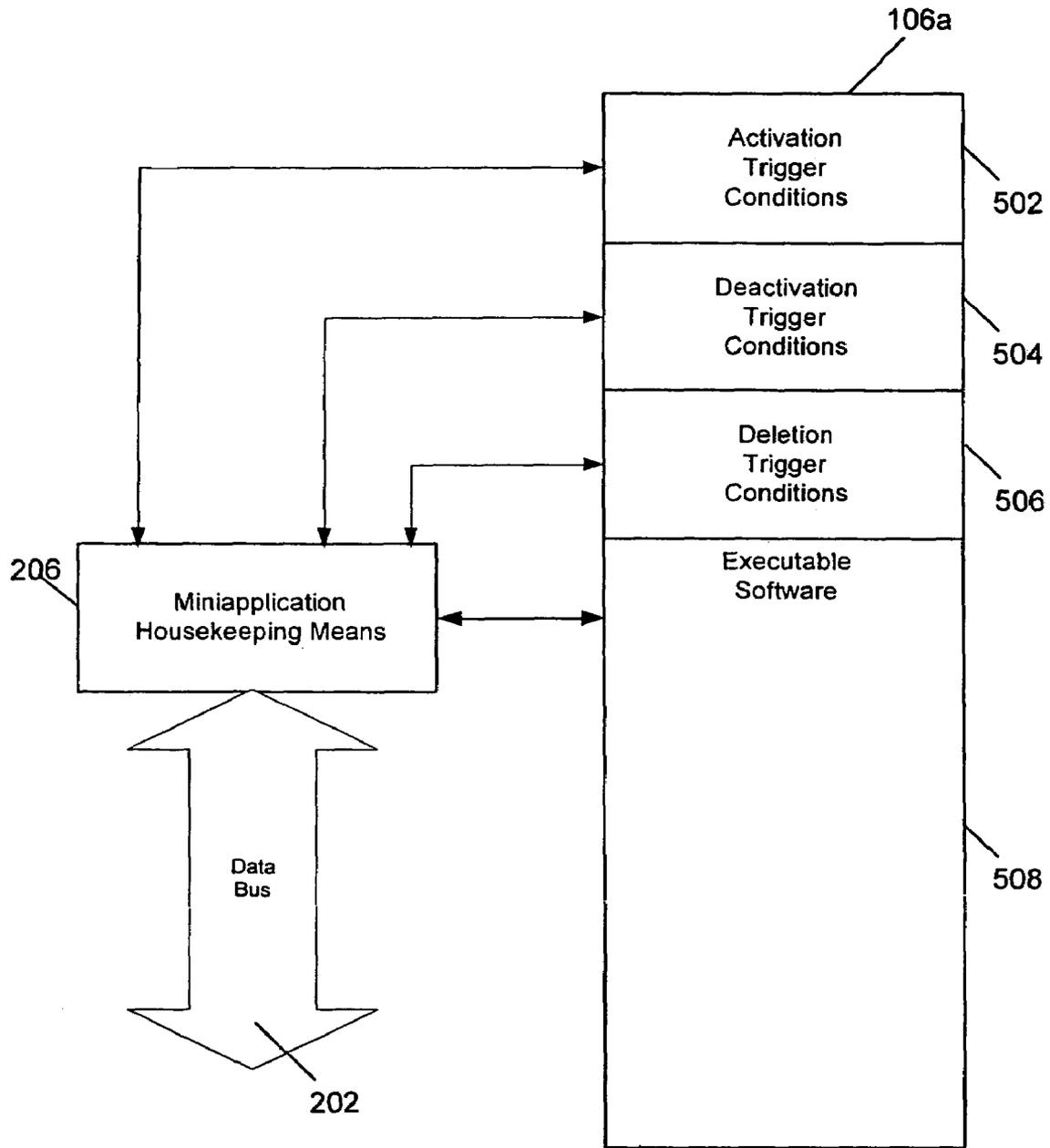


FIG. 5

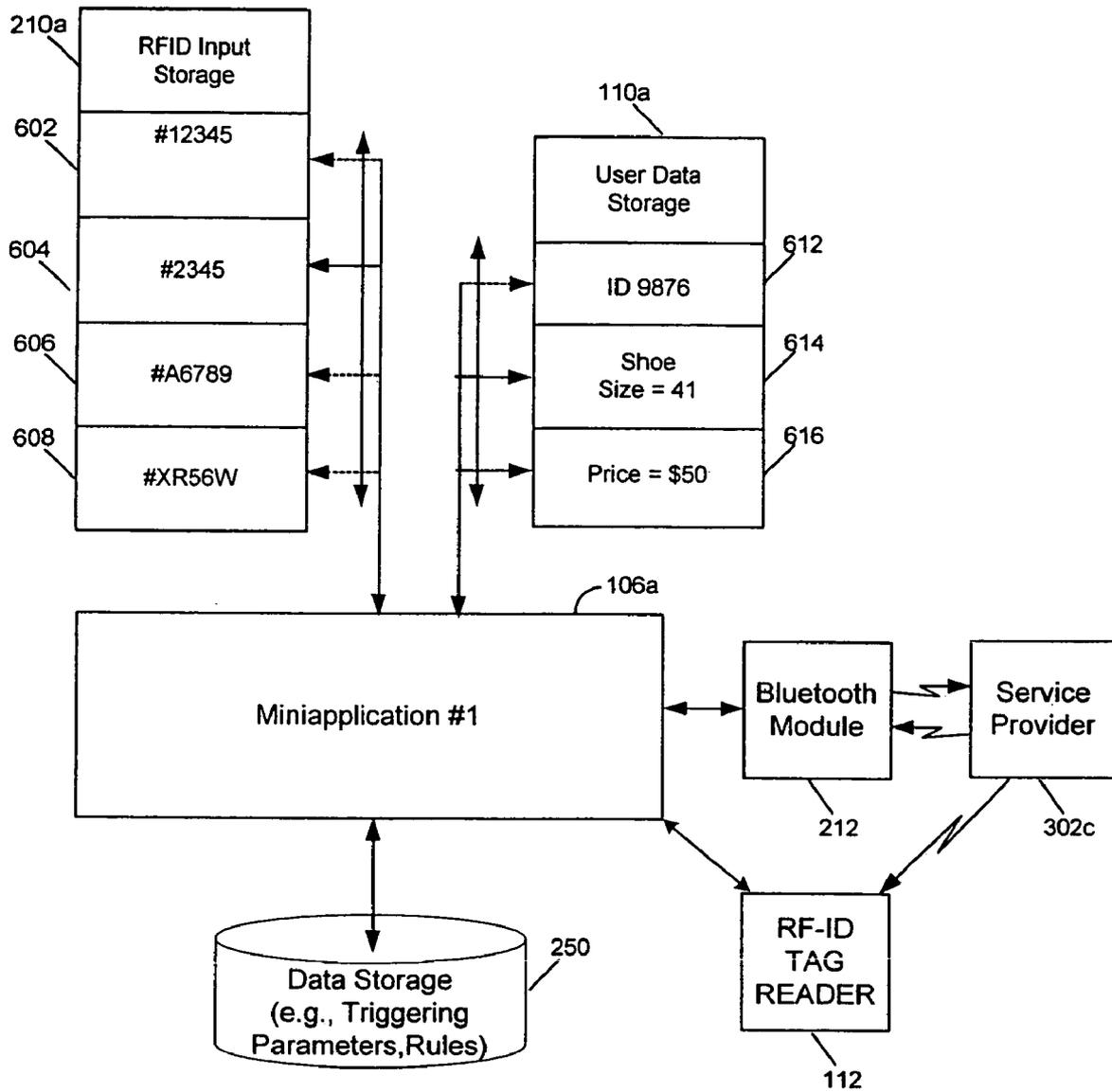


FIG. 6

DISPOSABLE MINI-APPLICATIONS

This is a continuation of application Ser. No. 10/286,221, filed Nov. 1, 2002, now U.S. Pat. No. 7,072,672.

FIELD OF THE INVENTION

The present invention relates to wireless communications systems in general and, more particularly, to an apparatus and method for efficiently managing the memory of a mobile terminal.

BACKGROUND OF THE INVENTION

Mobile terminals have become ubiquitous. One of the reasons for their popularity is their compact size. Another reason is their ability to run software applications that permit users to perform a variety of enhanced functions, beyond those relating to traditional telephony, while in a mobile environment. Unfortunately, the terminal's small size translates into a limited memory capability for storing applications and associated data, and thus, ultimately imposes limitations on the terminal's functionality. Another problem faced by users of mobile terminals equipped with software applications that provide enhanced functionality is having to ensure that they have the latest or most suitable versions of the applications stored on their terminals by manually updating or reconfiguring the applications. What is needed is a mechanism for efficiently managing software applications used by these mobile terminals and, more particularly, for efficiently managing a mobile terminal's memory space where applications are stored.

SUMMARY OF THE INVENTION

The above-identified problems are solved and a technical advance is achieved in the art by an apparatus and method for managing the storage of disposable mini-applications in a mobile terminal, such as a mobile telephone. An application, which comprises an executable software item of limited operability associated with conditions for one or more of downloading, activating, deactivating and deleting the software item, is referred to herein as a disposable mini-application, as will be discussed in detail hereinafter.

An exemplary method for a mobile terminal having a processor and a memory for processing and storing data to manage storage of executable software items of limited operability comprises: downloading an executable software item comprising at least one condition for deletion of the executable software item over a wireless connection, wherein the executable software item enables access to at least one service at a specified location; storing the executable software item including the condition for deletion of the executable software item in storage of the mobile terminal; and if the condition for deletion of the executable software item is satisfied, deleting the executable software item from storage of the mobile terminal.

In an alternate embodiment, an exemplary method comprises: downloading an executable software item together with trigger conditions for activation and deletion of the executable software item over a wireless connection, wherein the executable software item enables access to at least one service at a specified location; storing the executable software item together with the trigger conditions for activation and deletion of the executable software item in storage of the mobile terminal; if a trigger condition for activation of the executable software item is satisfied, acti-

vating the executable software item; and if a trigger condition for deletion of the executable software item is satisfied, deleting the executable software item from storage of the mobile terminal.

In yet an alternate embodiment, an exemplary method comprises: downloading a first executable software item upon entry of the mobile terminal into a first location together with a trigger condition for deletion of the first executable software item; downloading a second executable software item upon entry of the mobile terminal into a second location together with a trigger condition for deletion of the second executable software item; monitoring for trigger data that satisfies the trigger condition for deletion of the second executable software item; and deleting the second executable software item upon detection of trigger data that satisfies the trigger condition for deletion of the second executable software item.

In an embodiment directed to a method for a mobile terminal having a processor and a memory for processing and storing data to manage storage of an executable software item of limited operability that provides a user of the mobile terminal with shopping assistance, an exemplary method comprises: downloading an executable software item for providing a user of a mobile terminal with assistance while shopping, wherein the executable software item comprises data comprising an identification of one or more shopping service locations and trigger conditions for activation and deletion of the executable software item from memory of the mobile terminal; detecting, via a short range wireless connection, that the user is located within proximity of one of the shopping service locations; accessing user data comprising indications of goods and/or services of interest to the user; comparing goods and/or services offered by the shopping service location with the user data to determine whether there is a match; if there is a match, activating the executable software item; and executing the executable software item, wherein execution of the executable software item comprises: generating a query for transmission to the shopping service location, the query including the user data; and transmitting the query to the shopping service location via a short range wireless connection. In this embodiment, a shopping service location may be a service desk, a shop or the like in a shopping center/mall or any smaller location therein including an aisle, shelf, counter, stand, etc. where goods and/or services are made available for consumption, as will be discussed in detail hereinafter.

In one embodiment of the present invention, the data or the individual data items mentioned above that are stored in the mobile terminal, such as user data and the data relating to trigger parameters and trigger conditions downloaded to the mobile terminal or stored therein, may be expressed using markup language expressions or compressed markup language expressions of an XML-based markup language.

Other and further aspects of the present invention will become apparent during the course of the following description and by reference to the attached drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a block diagram illustrating an exemplary arrangement between a mobile terminal and a service provider in which a disposable mini-application may be downloaded and used in accordance with one embodiment of the present invention.

FIG. 2 is a block diagram illustrating an exemplary mobile terminal in accordance with one embodiment of the present invention.

FIG. 3 is a simplified layout of an area such as a shopping mall, department store or shop illustrating the location of nodes for data transfer between mobile terminals and one or more service providers in accordance with one embodiment of the present invention.

FIG. 4 is a flowchart illustrating an exemplary process by which a disposable mini-application may be used in a mobile terminal.

FIG. 5 is a block diagram illustrating the performance of a disposable mini-application housekeeping function.

FIG. 6 is a block diagram illustrating an exemplary disposable mini-application for providing purchasing assistance to a user while the user is shopping in a shopping mall, a shop or any shopping service location thereof in accordance with one embodiment of the present invention.

DETAILED DESCRIPTION

In the following description of the various embodiments, reference is made to the accompanying drawings which form a part hereof, and in which are shown by way of illustration various embodiments in which the invention may be practiced. It is to be understood that other embodiments may be utilized and structural and functional modifications may be made without departing from the scope of the present invention.

FIG. 1 is a block diagram illustrating an exemplary arrangement between a mobile terminal and a service provider in which a disposable mini-application may be downloaded and used in accordance with one embodiment of the present invention. As shown in FIG. 1, mobile terminal 100, which may be a hand-held wireless telephone, a mobile handset terminal, a personal digital assistant ("PDA"), a portable computer or the like includes storage 106 for one or more disposable mini-applications downloaded from a service provider 150, preferably over a wireless connection.

A disposable mini-application is an executable software item, such as a Java applet, a script or a software agent of limited operability for performing one or more functions on a mobile terminal 100. With respect to its limited operability, in addition to being associated with one or more conditions for its deletion, a disposable mini-application is preferably also associated with one or more conditions (such as the physical location of the mobile terminal) for one or more of its downloading, activation and deactivation, as will be discussed in detail hereinafter.

Mobile terminal 100 may download a disposable mini-application from service provider 150 over either a short range wireless network 120, such as a Personal Area Network (e.g., IrDA or Bluetooth PANs) or a wireless LAN (e.g., wireless IEEE 1394, IEEE 802.11 or HiperLAN/2) or a mobile WAN 130 (e.g. GPRS, GSM, etc.). In this regard, service provider 150 includes a short range wireless connection 156 and/or WAN connection 157 for use in downloading a disposable mini-application to mobile terminal 100 over short range wireless network 120 or mobile WAN 130, respectively. Service provider 150, which may be a single entity, such as a single store, or an entity representing a plurality of stores, such as a shopping mall, includes a processor 152 coupled to a data base 154 for storing one or more disposable mini-applications (together with any associated data) for downloading to mobile terminal 100 for activation and use.

In accordance with one embodiment of the present invention, a mobile terminal 100 may download a disposable mini-application provided that any preconditions for downloading it that have been established by either terminal 100

or service provider 150 have been satisfied, as will be discussed in detail hereinafter in connection with FIG. 4. Once downloaded, the disposable mini-application may be activated, deactivated and/or deleted from storage 106 based on whether trigger conditions for doing so have been satisfied, as will also be discussed in detail in connection with FIG. 4. These trigger conditions are preferably downloaded together with the disposable mini-application from service provider 150. In one embodiment, a trigger condition may comprise trigger parameters and rules, as will be discussed in detail hereinafter. The downloaded trigger conditions, trigger parameters and rules may be expressed using markup language expressions or compressed markup language expressions preferably using an XML-based markup language.

Briefly, trigger parameters may be based upon one or more of a location, a date/time, user input, etc. Trigger parameters also may be based upon personal user data such as profile, calendar, intents and notes data. A user's profile may include a user's name, address, phone number(s), gender, age, employer, hobbies, car model, car registration number, preferences (e.g., a preferred genre of books), loyalty card memberships, credit/debit card information and the like. A user's calendar stores user generated entries for events such as appointments, birthdays, visits, holidays, vacations, shows, etc. correlated to a date and time when the event is to occur. A user's intentions may be user-specified intended tasks or acts to be performed by her such as "grocery shopping", "birthday present shopping", "car wash", "hair cut", etc. Notes may include user-generated instructions to be followed by the user when performing a task. Exemplary notes include a shopping list, a wish list for a family member, a spouse's perfume or cologne preferences, etc. Preferably, the user may activate these intents/notes at any time for a period of time (such as from now until otherwise indicated) or can associate them with a date/time in a calendar or to a location for automatic activation. In any event, such personal data may be stored either locally in user data storage 108a or remotely in user data storage 108b where mobile terminal 100 may readily access it whenever needed over, e.g., mobile WAN 130, for use in determining whether trigger parameters associated with a disposable mini-application have been satisfied. The data relating to personal user data may be stored using markup language expressions or compressed markup language expressions, preferably using an XML-based markup language.

As mentioned above, in one embodiment of the present invention, trigger conditions may comprise rules in addition to trigger parameters. Rules are one or more trigger parameters needed to effect an action such as activating, deactivating or deleting a disposable mini-application, as will also be discussed in detail hereinafter.

As further shown in FIG. 1, mobile terminal 100 includes an RF-ID tag 110 and an RF-ID tag reader 112. Service provider 150 likewise includes RF-ID tag readers 158 and RF-ID tags 159. As will be discussed in detail hereinafter, an RF-ID wireless system comprising an RF-ID tag 110 of mobile terminal 100 and RF-ID tag readers 158 of service provider 150 or, alternatively, an RF-ID tag reader 112 of mobile terminal 100 and RF-ID tags 159 of service provider 150, may be used in one embodiment of the present invention to determine the user's location within a service provider 150's premises for use in satisfying a precondition for downloading a disposable mini-application or, satisfying a trigger condition for activating, deactivating and/or deleting the disposable mini-application.

An RF-ID tag is a wireless transponder that may contain varying amounts of information ranging from a tag identifier to 128 Kbytes of variable memory that can be programmed with additional information. An RF-ID tag reader communicates with a tag through the use of RF energy. In particular, an RF-ID tag reader sends out an interrogation signal which “wakes up” a tag situated within a predetermined proximity to the reader. A tag may be “passive” in that it operates without an internal battery source, deriving the power to operate from the RF field generated by the RF-ID reader, which is inductively coupled to the tag. Alternatively, a tag may be “active”, and thus, powered by an internal battery that allows a greater communication range and higher data transmission rates. Once interrogated, the tag will transmit a signal including its ID number and possibly other information back to the RF-ID tag reader. RF-ID wireless network principles are described in a publication entitled “Radio Frequency Identification: A Basic Primer”, published by Automatic Identification Manufacturers (AIM), website: (www.aimglobal.org), Aug. 23, 2001, a copy of which is incorporated herein by reference. The data stored in an RF-ID tag may be stored at least partly in a format of a markup language expression of an XML-based markup language.

In one embodiment, service provider **150** may have installed RF-ID tags **159** throughout its premises. Mobile terminal **100** may use its RF-ID tag reader **112** to determine its entrance into, current location within, and departure from, a predetermined area by sensing one or more of service provider **150**’s RFID tags **159**, as will be discussed in detail hereinafter in connection with FIG. **6**, and use this location information for downloading, activating, deactivating and/or deleting a disposable mini-application without the mobile terminal **100** having to disclose its location to service provider **150**.

Given the foregoing, an exemplary trigger parameter for activation of a mini-application may be the identification number of an RF-ID tag **159** read by RF-ID tag reader **112** of mobile terminal **100**. Another trigger parameter may be a specific number, such as the numeral “1”, entered by the user via keyboard **104**. In view of these trigger parameters, an exemplary rule may be that if the first number of the RF-ID tag’s identification number read by RF-ID tag reader **112** is a “1” and the number entered by the user is a “1”, then the disposable mini-application is activated.

In an alternate embodiment, service provider **150** may have RF-ID tag readers **158**, rather than RF-ID tags **159**, installed throughout its premises for use in detecting an RF-ID tag **110** of mobile terminal **100**. Service provider **150** associates each tag reader **158** with a location in the premises. Thus, in one embodiment, service provider **150** may use a signal generated by an RF-ID tag **110** that has been detected by an RF-ID tag reader **158** located at the entrance of its premises to detect the user’s entry so that a disposable mini-application may be downloaded to terminal **100** via a bi-directional network, such as short range wireless network **120**. The signal generated by the RF-ID tag **110** of mobile terminal **100** may include information concerning the user’s identity for use in personalizing the disposable mini-application to the user based on data stored locally in service provider data base **154** (e.g., loyalty data and/or the user’s past purchasing history) and/or remotely in user data storage **108c**. Personalization also may be based upon user data stored in terminal **100** (e.g., in user data storage **108a**) that is transmitted to service provider **150** over, e.g., short range wireless network **120**.

In this alternate embodiment, RF-ID tag **110** of mobile terminal **100** also may be used to provide the service provider **150** with terminal **100**’s current location within, and departure from, its premises. In particular, service provider **150** may determine the user’s location based on the identity of the RF-ID reader **158** that received the RF-ID tag signal. The service provider **150** may transmit this location information to mobile terminal **100** via network **120** for use in triggering activation, deactivation or deletion of a disposable mini-application, as will be discussed in detail hereinafter in connection with FIG. **4**.

Once activated, the disposable mini-application begins executing, during which time it may perform a variety of functions including generating outputs to and, receiving inputs from, user interfaces (**102**, **104**), respectively, of mobile terminal **100**. In one embodiment, the user inputs received during execution may be used to formulate inquiries that are transmitted to service provider **150** over, e.g., short range wireless network **120** to request information on goods and/or services, as will be discussed in detail hereinafter in connection with FIG. **6**. The service provider **150** may formulate responses to the inquiries based on user data transmitted to it by mobile terminal **100** and/or user data, such as customer loyalty data, stored locally in data base **154** of service provider **150** and/or other user data **108c** that is remotely accessible to it via network(s) **140**. The data stored in data base **154** of the service provider **150** and/or other user data **108c** may be stored at least partly in a format using a markup language expression or a compressed markup language expression of an XML-based markup language.

Ultimately, when the associated trigger conditions are satisfied, the disposable mini-application may be deactivated and/or deleted, as will also be discussed in detail hereinafter in connection with FIG. **4**. The deletion of a disposable mini-application means that the application and any copies thereof in the mobile terminal **100** to which it has been downloaded are deleted completely, or at least partly, from the storage location where they reside or are otherwise made non-executable or non-accessible. Trigger conditions for deletion of a disposable mini-application are unconditional limits placed upon its use based on temporal, location-specific and like factors such as a limited number of uses. For example, trigger conditions for deletion may comprise the completion of a task to be performed by the disposable mini-application or the passage of time since the disposable mini-application was downloaded or activated. In the latter case, the time limit may be expressed preferably as elapsed time (e.g., three (3) hours), wherein the disposable mini-application may comprise a time counter that counts up or down until the time limit has been reached thereby triggering deletion.

FIG. **2** is a block diagram illustrating an exemplary mobile terminal in accordance with one embodiment of the present invention. As shown in FIG. **2**, mobile terminal **100** includes user interfaces (**102**, **104**). Interface **102** may be a display, preferably, one with a touch screen capability, as is well-known in the art. The display **102** preferably is also capable of presenting textual, graphical and/or image data, including animations and video clips, to the user. Interface **104** may be a keypad, which preferably comprises numerous function keys such as alpha-numeric keys and directional (arrow) keys, for permitting a user to perform such functions described herein as generating user inputs in response to prompts, creating and modifying user data, etc. Alternatively, or in addition thereto, a pointing device may be used to manipulate stored and/or displayed data. Moreover, terminal **100** also preferably includes a microphone (not

shown) for receiving audio input, such as voice commands. It also preferably includes a speaker(s) and/or an earphone, for audio output (not shown), which, together with display **102**, enables the presentation of all media types, such as multimedia service (MMS) messages, to the user of mobile terminal **100**.

Terminal **100** also includes a CPU **200** and associated programming for controlling data processing and transfer operations among the various components of terminal **100** via a data transfer bus **202**. As shown in FIG. 2, terminal **100** further includes one or more disposable mini-applications **106a**, **106b** that have been downloaded from one or more service providers **150** using, e.g., short range wireless connection **212** or mobile WAN connection **214**. Although only two disposable mini-applications are shown in FIG. 2, it is to be understood that more than two may be stored in terminal **100** provided that there is sufficient memory for doing so. For each disposable mini-application, terminal **100** stores trigger conditions in data storage **250**. As mentioned above, these trigger conditions may include trigger parameters and rules that were downloaded with the disposable mini-application for use in determining when activation, deactivation and/or deletion of the associated disposable mini-application is to occur.

Mobile terminal **100** also includes a house-keeping means **206**, which, in one embodiment, monitors for trigger data that satisfies trigger parameters and rules associated with the disposable mini-applications (**106a**, **106b**). Mobile terminal **100** includes a variety of sources of trigger data collected from the user's environment for use in determining whether trigger parameters and rules have been satisfied. In addition to the sources discussed above in connection with FIG. 1 (e.g., RF-ID tag **110** and RF-ID tag reader **112** for collecting location information), mobile terminal **100** may include sensors (**216**, **217**), such as a GPS receiver, a bar code reader, a camera, an environmental sensor (e.g., a thermometer) or the like, and a date/time means **218**. Trigger data received from these sources may be stored temporarily in storage devices **210a-217a** pending analysis by housekeeping means **206** vis-à-vis trigger parameters and rules. In addition to monitoring for such trigger data, housekeeping means **206** also may comprise a user interface to assist the user in downloading, activating, deactivating and deleting disposable mini-applications **106**.

Housekeeping means **206** also may perform various other housekeeping functions, such as interfacing disposable mini-applications with the operating characteristics of mobile terminal **100** and supervising and controlling data transfer and processing between input and output data of disposable mini-application **106a** and input and output data of mobile terminal **100**. Moreover, housekeeping means **206** may itself be a disposable mini-application with trigger conditions associated with its use in mobile terminal **100**, as will be discussed in detail hereinafter in connection with FIG. 5.

It will be readily appreciated that mobile terminal **100** also includes conventional hardware and functionality, which may be employed in operating mobile terminal **100** as a mobile phone, but which are well known to those skilled in the art, and thus, are not shown in FIG. 2.

FIG. 3 is a simplified layout of an area **300** such as a shopping mall, department store or a shop illustrating the location of nodes for data transfer between one or more service providers and mobile terminals in accordance with one embodiment of the present invention. The shopping mall, department store or shop comprises a plurality of different service points or shopping service locations

(**302a-e**, **306**), such as shops in a mall, departments in a department store or service desks in a shop. It is to be understood, however, that the present invention is applicable to other service consumption situations that are a form of shopping such as dining in a restaurant, staying in a hotel, watching a movie or play at a theatre, attending a sporting event, listening to a concert, etc. Common to all these situations is that the user of mobile terminal **100** is at a physical location to which a disposable mini-application may relate. As further shown in FIG. 3, area **300** also has one or more entrances/exits **312a-c**, some of which may be used only for entering or exiting area **300** or all of which may be used for both entering and exiting area **300**.

Area **300** also is provided with one or more nodes **304a-e**, **314a-c** and **320** for establishing a data transfer with a mobile terminal **100**. Each node may be either a short range wireless connection **156**, RF-ID tag readers **158**, RF-ID tags **159** or the like or any combination thereof. Nodes **314a-c**, which are positioned at entrances/exits **312a-c**, may be used to detect the entry of the user into, or exit from, area **300** for downloading, activating, deactivating or deleting a disposable mini-application. As shown in FIG. 3, each node **304a-e** is associated with a different service point **302a-e**, and thus, may be used to detect the entry of the user into, or exit from, the specific areas associated with these service points. As also shown in FIG. 3, node **320** may be, e.g., a kiosk for downloading a disposable mini-application for general information about area **300**, such as a map of area **300**. Alternatively, or in addition thereto, node **320** also may serve as a common node for a plurality of service points that do not have a dedicated node of their own, such as service points **306**.

FIG. 4 is a flowchart illustrating an exemplary process by which a disposable mini-application may be used in a mobile terminal. Before a disposable mini-application may be used, it must first be downloaded to mobile terminal **100**. In one embodiment, service provider **150** advises a user of the availability of one or more disposable mini-applications by sending a message to mobile terminal **100** over short range wireless network **120** or mobile WAN **130** using, e.g., SMS/MMS, or by using more conventional forms of advertising media such as leaflets or coupons. The message may include information that the user may need in order to download the disposable mini-application from service provider **150**, such as a network address. Also, the message or other forms of advertising may be sent to the user well in advance of mobile terminal **100** reaching a particular location associated with the disposable mini-application or only after the user is in the vicinity of, or at, that location.

Service provider **150** may send this message to mobile terminal **100** based on the user's context, such as her location, a particular instant in time, her current or intended activity or the like, or even any combination thereof. If not transmitted to mobile terminal **100** based on the user's context, then housekeeping means **206** itself may use the user's context comprising one or more of her disclosed profile, calendar, intentions or notes as may be stored in user data **108a** of mobile terminal **100** to filter messages concerning the availability of disposable mini-applications for the user. In this manner, housekeeping means **206** may insure that only those disposable mini-applications that are the most relevant to the user are presented to her for downloading.

Additionally, housekeeping means **206** may allow only those disposable mini-applications (or versions thereof) that are compatible with the functional capabilities of the mobile terminal **100** to be downloaded. For example, a disposable

mini-application **106** may require that mobile terminal **100** be equipped with minimum memory or processing capabilities, or even other software applications such as a media player, in order for the disposable mini-application **106** to execute properly. Housekeeping means **206** may run a check on the terminal or interrogate the user to determine whether mobile terminal **100** satisfies all of these requirements before downloading the disposable mini-application to local memory. Moreover, housekeeping means **206** also may provide the user with instructions and/or suggestions for satisfying these requirements.

A disposable mini-application **106** that may otherwise be available for downloading may nevertheless include restrictions on downloading or subsequent use. One such restriction may be that the recipient be a registered user of the service provider **150** or that the recipient pay a fee for the download, which, in one embodiment, may be charged upon downloading the disposable mini-application but credited upon purchase of products or services that exceed a predetermined amount. In one embodiment, housekeeping means **206** may enforce these restrictions by soliciting user compliance through a graphical user interface. Moreover, a disposable mini-application may have restrictions on forwarding of the mini-application that are communicated to the user via, e.g., display **102**. Such restrictions may be enforced through use of encryption techniques (e.g., digital certificates).

Assuming that all pre-conditions for downloading (if any) have been satisfied, then in step **420** of FIG. **4**, the user may download the disposable mini-application to mobile terminal **100**. Once downloaded, the disposable mini-application may need to be activated before it can be executed. In one embodiment, this activation is controlled by mini-application housekeeping means **206**, which extracts the trigger conditions for activation as well as those for deactivation and deletion from disposable mini-application **106a**, and then, in steps **404**, **412** and **416**, respectively, determines whether these trigger conditions have been satisfied.

The trigger conditions for activation may comprise one or more trigger parameters and one or more rules. For example, if the disposable mini-application is intended for use in a certain location, then the current location of the user may be trigger data that satisfies the location trigger parameter. If the rule for activation of the disposable mini-application depends upon not only location data but also user input such as pressing a key on keypad **104** or issuing a voice command to accept the mini-application in response to a prompt from housekeeping means **206** to do so, then the specified user input would be another trigger parameter for which the disposable mini-application housekeeping means **206** would monitor.

Other trigger parameters that may be used either alone or in combination with location data and/or user input data include, but are not limited to, the current date/time, user data, or the identification of the user. With respect to user identification, the user may identify herself, e.g., by presenting her RF-ID tag **110** to the RF-ID tag reader **158** of service provider **150** for comparison with stored user identification information, such as a customer loyalty number. In return, mobile terminal **100** may receive an activation code from service provider **150** over short range wireless network **120** or mobile WAN **130** for activating the mini-application. Mini-application housekeeping means **206** monitors the available sources of trigger data for data that may satisfy an activation trigger parameter and rule, and thus, that may activate a disposable mini-application. These sources of trigger data may include one or more of: user input received

via user interfaces (**102**, **104**); data in storage devices **210a–217a** (i.e., data received from RF-ID tag reader **112**, short range wireless connection **212**, mobile WAN **214** and environmental sensors (**216**, **217**)); the present date/time **218** and data in user data storage **108a**.

In step **404**, if the housekeeping means **206** determines that the trigger conditions for activation have not yet been satisfied then, in step **406**, a wait state is entered until the trigger conditions are satisfied. Housekeeping means **206** also may advise the user of the data needed for the activation trigger conditions to be satisfied. Thereafter, in the event that the necessary data is not received within a predetermined period of time, housekeeping mean **206** may delete the disposable mini-application **106a** from terminal **100**. However, once the conditions for activation have been satisfied then, in step **408**, the mini-application housekeeping means **206** activates the disposable mini-application **106a** and, in step **410**, the disposable mini-application begins executing.

Depending on the disposable mini-application, execution may comprise processing data, transferring data to and from the mobile terminal via wireless connections (**120**, **130**), displaying data to the user, prompting the user to input or provide access to user data, displaying choices to be made by the user, executing other applications, etc. During execution of disposable mini-application **106**, housekeeping means **206** will continue to monitor for user input as well as for data in storage devices **210a–217a** (e.g., location data, etc.), date/time data **218** and user data in storage **108a** for data that may be needed for the execution of the disposable mini-application as well as for data that will satisfy the trigger parameters and rules for de-activating and deleting disposable mini-application **106**. It will be appreciated that once activated, in an alternate embodiment, disposable mini-application **106a** itself, rather than housekeeping means **206**, may monitor for deactivation or deletion trigger data that satisfies associated trigger parameters and rules.

In addition to the foregoing, additional trigger conditions for deactivation and/or deletion also may include: the expiration of a timer value associated with the disposable mini-application; a use counter reaching a maximum number of uses permitted by the disposable mini-application; or, as mentioned above, the passage of a predetermined period of time without the receipt of any data relating to activation or execution of the disposable mini-application. The use counter may be in one embodiment of the present invention a down counter, whereby the counter counts down from a maximum number of uses and the trigger condition is that the counter value reaches zero. Deletion of a disposable mini-application also may occur in response to housekeeping means **206** determining that the mini-application is obsolete, as may be determined upon downloading a more recent version of the application than that currently stored in mobile terminal **100**.

If the trigger parameters and rules for deactivation and deletion are satisfied then, in steps **414** and **420**, disposable mini-application **106a** is deactivated and deleted, respectively. Even upon deactivation or deletion of the disposable mini-application, user data generated during execution, such as: data for configuring the disposable mini-application to the user or the mobile terminal **100**; the results of the executed disposable mini-application; or data indicative of the user's selections during execution (e.g., her purchasing history), may be retained for future use. For example, this user data may be stored in mobile terminal **100** or, alternatively, in a data base of the service provider, and may be associated with the deleted disposable mini-application for purposes of personalization when either the deleted dispos-

able mini-application or some other disposable mini-application is next downloaded to mobile terminal 100. Thus, in one embodiment, the service provider may identify the mobile terminal 100 upon next encountering it and personalize a disposable mini-application based on the stored user data prior to downloading it to mobile terminal 100. Moreover, personalization may require a user request or acceptance and a monetary fee could be charged therefor.

Returning to FIG. 4, if, however, it is determined in step 416 that the disposable mini-application should not be deleted, then in step 418 the disposable mini-application is maintained in storage and a wait state is entered in step 406 until, in step 404, the stored trigger conditions for activation are once again satisfied.

FIG. 5 is a block diagram illustrating the performance of a disposable mini-application housekeeping function. As shown in FIG. 5, disposable mini-application 106a comprises activation trigger conditions 502, de-activation trigger conditions 504, deletion trigger conditions 506 and executable software 508. Housekeeping means 206 may access both disposable mini-application 106a's trigger conditions (502, 504, 506) and executable software 508. In one embodiment, housekeeping means 206 may store the trigger conditions in storage 250 of mobile terminal 100. As shown in FIG. 5, housekeeping means 206 is coupled to data bus 202 and thus may relay data between disposable mini-application 106a and the various components of mobile terminal 100 discussed above in detail in connection with FIG. 2 for purposes of collecting trigger data and activating, executing, deactivating and, ultimately, deleting the disposable mini-application from memory.

In addition to interacting with one or more disposable mini-applications, housekeeping means 206 may itself, in one embodiment, be a disposable mini-application and have limitations associated with its use. For example, upon entering a department store, such as area 300 shown in FIG. 3, a user of mobile terminal 100 may download a housekeeping mini-application that is "proprietary" to that store and which controls the downloading, activation, execution, deactivation and deletion of other disposable mini-applications that are available only in that store.

Once downloaded and automatically activated, the housekeeping mini-application may download other disposable mini-applications from service provider 150 that are relevant to the user's context, such as her disclosed profile, calendar, intentions or notes, as may be indicated by data stored, e.g., in user data storage 108a, or that are relevant to mobile terminal 100's capabilities. The housekeeping mini-application also may advise the user of the other disposable mini-applications that are available and permit the user to select one or more of them for downloading and use. When the user exits the store, however, the housekeeping mini-application 106a may delete all of the downloaded mini-applications relating to that store and finally may delete itself to conserve memory space in mobile terminal 100 which then can be used for other purposes.

FIG. 6 is a block diagram illustrating an exemplary disposable mini-application for providing purchasing assistance to a user while the user is shopping in a shopping mall, a shop or any shopping service location thereof in accordance with one embodiment of the present invention.

Referring briefly to FIG. 3, a mobile terminal 100 passes through entrance 312a of a shopping mall 300 and, in particular, passes within proximity of data transfer node 314a. In one embodiment, node 314a includes a Bluetooth module, an RF-ID tag reader and an RF-ID tag for data transfer with one or more mobile terminals 100. In one

embodiment, the RF-ID tag reader of node 314a detects an RF-ID tag 110 of mobile terminal 100 and, in response, transmits a message to terminal 100 via a Bluetooth connection to advise the user of the availability of a disposable mini-application that can assist her in making purchases at shops 302a-e, 306 and using kiosk 320 within the mall. Upon receiving an indication of user acceptance, the disposable shopping mini-application is downloaded from node 314a to terminal 100 via the Bluetooth connection. In the embodiment illustrated in FIG. 3, each shop 302a-e in mall 300 is associated with its own data transfer node 304a-e. As mentioned above, in an exemplary embodiment, each node 302a-e also comprises a Bluetooth connection, an RF-ID tag reader and an RF-ID tag for data transfer with mobile terminals 100, as will be discussed further below.

Turning now to FIG. 6, disposable shopping mall mini-application 106a, which has been downloaded from node 314a, is shown together with data storage 250 in the mobile terminal 100, wherein trigger parameters and rules for activation, deactivation and deletion of the disposable mini-application are stored.

In the exemplary embodiment shown in FIG. 6, the trigger parameters for activation may include an RF-ID number list (not shown) of the ID numbers of the RF-ID tags of all data transfer nodes in the shopping mall including nodes 304a-e corresponding to shops 302a-e together with keywords (not shown) associated with the services and/or goods offered by each shop. The RF-ID number list preferably also includes the identification numbers of RF-ID tags associated with kiosk 320 and any information, such as keywords, concerning good/services available at shops 306 associated therewith. A rule for activation of the disposable mini-application may be that one or more of the keywords associated with a received RF-ID tag identification number matches an item that is on the user's electronic shopping list that is stored in user data storage 108a of mobile terminal 100.

A trigger parameter for de-activation or deletion of the disposable shopping mall mini-application may be a list of RF-ID identification numbers of data transfer nodes 314a-c, which are situated near mall exits 312a-c. An exemplary rule for deactivation and/or deletion may be the receipt of one of the RF-ID numbers for nodes 314a-c indicating that the user has, or is about to, leave the mall either alone or in combination with other trigger data such as user input confirming de-activation and/or deletion.

As discussed above, housekeeping means 206 extracts the trigger parameters and rules from the disposable mini-application and then (1) monitors RF-ID tag storage 210a of mobile terminal 100 for satisfaction of a trigger parameter—namely, for receipt of an identification number of an RFID tag that matches an identification number in the downloaded RF-ID number list and (2) determines whether a rule for activation, deactivation or deletion has been met. As shown in FIG. 6, RF-ID tag number input storage 210a may buffer a plurality of RF-ID tag identification numbers (602-608) received via RF-ID tag reader 112.

In the example shown in FIG. 6, RF-ID tag reader 112 receives one or more identification numbers from various RF-ID tags in the mall, including identification number "2345". The housekeeping means 206 continuously compares the RF-ID tag numbers that it is receiving against the list of RF-ID tag numbers that it has downloaded in connection with the disposable shopping mini-application. In this particular case, the comparison results in a determination that RF-ID tag number "2345" corresponds to a shop 302c by the name of "Susan's Shoes"; keywords: shoes, sneakers, sandals, boots, women.

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Thereafter, housekeeping means 206 determines whether any of the keywords associated with the received RF-ID tag number “2345” match any of the items on the user’s shopping list. In this example, the user’s shopping list includes “shoes” as an item that the user intends to purchase. Since the rule for activation has been satisfied (i.e., a received RF-ID tag number matches one on the RF-ID number list and a keyword associated with the matching RF-ID tag number matches an item on the user’s shopping list), housekeeping means 206 activates the shopping mall mini-application 106a. It will be appreciated that other data may be used for comparison with key words, and thus, for determining whether the mini-application should be activated. Such other data may include stored profile information indicating not only that the user is interested in purchasing shoes, but also that the user is a women, and thus, is likely to be interested in purchasing woman’s shoes.

Once activated, the shopping mall mini-application 106a begins executing by formulating an inquiry either automatically or, with user assistance (elicited using, e.g., a series of prompts), for transmission to “Susan’s Shoes” (i.e., shop 302c). The inquiry is formulated by selecting data from user data storage 108a for inclusion in the inquiry so that the user receives only information likely to be of interest to her. This user data may include a user ID 612, a shoe size 614, a price limit 616, a brand name (not shown) or the like.

In the present example, the shoe size 614 and price limit 616 are selected from user data storage and formulated into an inquiry. An inquiry may be “Do you have Size 41 shoes for \$50 or less?” Once the inquiry has been formulated, disposable mini-application 106a uses Bluetooth module 212 of mobile terminal 100 to transmit the inquiry to shop 302c via data transfer node 304c. If “Susan’s Shoes” shop 302c can meet the conditions set forth in the inquiry, a response is transmitted via node 304c to mobile terminal 100 for display to the user. The handling of the inquiries in the shop 302c may be automated or handled by a salesperson.

In the event that a response is not received from shop 302c after a predetermined period of time, housekeeping means 206 may deactivate the shopping mall mini-application and enter a wait state until trigger conditions for activation are satisfied. Additionally, as mentioned above, upon receipt of a trigger parameter such as an RF-ID tag number for any one of nodes 314a-c, which corresponds to a mall exit, thus indicating that the user is about to leave or has left the mall, housekeeping means 206 may delete the shopping mall mini-application from memory. This may occur either automatically or upon receiving a deletion confirmation from the user, depending upon the trigger parameter and rule for deletion.

The many features and advantages of the present invention are apparent from the detailed specification, and thus, it is intended by the appended claims to cover all such features and advantages of the invention which fall within the true spirit and scope of the invention.

Furthermore, since numerous modifications and variations will readily occur to those skilled in the art, it is not desired that the present invention be limited to the exact construction and operation illustrated and described herein, and accordingly, all suitable modifications and equivalents which may be resorted to are intended to fall within the scope of the claims.

We claim:

1. A method for a mobile terminal, comprising:

downloading over a wireless connection an executable software item including at least one condition for deletion of the executable software item, wherein the

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executable software item enables access over a short range wireless connection to information concerning at least one of goods or services when the mobile terminal is within a specified location associated with a short range wireless system;

storing the executable software item including the condition for deletion of the executable software item in storage of the mobile terminal; and

if the condition for deletion of the executable software item is satisfied, deleting the executable software item from storage of the mobile terminal.

2. The method of claim 1 wherein the mobile terminal is a mobile telephone or a mobile handset.

3. The method of claim 1 wherein the mobile terminal has communications capabilities comprising one or more of cellular, local area wireless, short range wireless and RFID.

4. The method of claim 1 further comprising: receiving a message concerning an executable software item that is available for downloading.

5. The method of claim 4 wherein the message is associated with a context of the user.

6. The method of claim 4 further comprising: filtering the message in accordance with a context of the user; and

if the message matches the user’s context, notifying the user of the message.

7. The method of claim 4 further comprising: determining requirements for downloading of the executable software item; and

if capabilities of the mobile terminal meet the requirements, downloading the executable software item to the mobile terminal.

8. The method of claim 7 wherein the requirements for downloading of the executable software item comprises requirements for execution of the executable software item.

9. The method of claim 1 wherein the condition for deletion of the executable software item comprises a trigger parameter and a rule.

10. The method of claim 9 wherein a trigger parameter comprises at least partly one or more of a user’s location, a date, a time and user data and a rule comprises one or more trigger parameters needed to effect deletion of the executable software item.

11. The method of claim 10 wherein the user’s location is determined by the mobile terminal using an RF-ID system.

12. The method of claim 10 wherein user data comprises at least partly one or more of user profile data, calendar data, intents data and notes data.

13. The method of claim 1 wherein the condition for deletion of the executable software item comprises a timer value and deletion of the executable software item is initiated upon expiration of the timer value.

14. The method of claim 1 wherein the condition for deletion of the executable software item comprises a use counter and deletion of the executable software item is initiated upon the use counter reaching a predetermined number.

15. The method of claim 1 wherein the condition for deletion of the executable software item comprises a passage of a predetermined period of time without receipt of data relating to activation of the executable software item and the executable software item is deleted after expiration of the predetermined period of time.

16. The method of claim 15 wherein the predetermined period of time is specified in the executable software item as a condition for deletion of the executable software item.

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17. The method of claim 1 wherein the condition for deletion comprises a determination that the executable software item is obsolete.

18. The method of claim 1 further comprising: maintaining, in storage, data associated with the executable software item after deletion of the executable software item from storage.

19. The method of claim 18 wherein the storage is in the mobile terminal.

20. The method of claim 18 wherein the storage is in a service provider's data base.

21. The method of claim 20 wherein the data associated with the executable software item is data for use by the service provider in personalizing an executable software item when next downloaded by the mobile terminal.

22. The method of claim 18 wherein the data maintained in storage comprises data generated during execution of the executable software item.

23. The method of claim 1, further comprising: activating execution of the downloaded executable software item at the specified location for accessing the at least one of goods or services over the short range wireless connection.

24. The method of claim 1, wherein the condition for deletion of the executable software item comprises that the mobile terminal has departed or is about to depart from the specified location associated with the short range wireless system.

25. A method for a mobile terminal, comprising: downloading over a wireless connection an executable software item together with trigger conditions for activation and deletion of the executable software item, wherein the executable software item enables access over a short range wireless connection to information concerning at least one of goods or services when the mobile terminal is within a specified location associated with a short range wireless system;

storing the executable software item together with the trigger conditions for activation and deletion of the executable software item in storage of the mobile terminal;

if a trigger condition for activation of the executable software item is satisfied, activating the executable software item; and

if a trigger condition for deletion of the executable software item is satisfied, deleting the executable software item from storage of the mobile terminal.

26. The method of claim 25 wherein the mobile terminal is a mobile telephone or a mobile handset.

27. The method of claim 25 wherein the executable software item is downloaded to the mobile terminal only if a pre-condition for downloading is satisfied.

28. The method of claim 25 further comprising: if the trigger condition for activation of the executable software item is not satisfied, then entering a wait state until the trigger condition for activation is satisfied.

29. The method of claim 25 wherein the trigger condition for deletion of the executable software item comprises whether the trigger condition for activation has not been satisfied within a predetermined period of time.

30. The method of claim 29 wherein the predetermined period of time is specified in the application as a trigger condition for activation of the executable software item.

31. The method of claim 25 wherein the trigger condition for activation comprises a trigger parameter and a rule.

32. The method of claim 31 wherein a trigger parameter comprises at least partly one or more of a user's location, a

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date, a time and user data and a rule comprises one or more trigger parameters needed to effect activation of the executable software item.

33. The method of claim 32 wherein the user's location is determined by the mobile terminal using an RF-ID system.

34. The method of claim 32 wherein user data comprises at least partly one or more of user profile data, calendar data, intents data and notes data.

35. The method of claim 31 wherein a trigger parameter for activation comprises another executable software item that is present in the mobile terminal.

36. The method of claim 25, wherein the condition for deletion of the executable software item comprises that the mobile terminal has departed or is about to depart from the specified location associated with the short range wireless system.

37. A method for a mobile terminal, comprising: downloading a first executable software item upon entry of the mobile terminal into a first location together with a trigger condition for deletion of the first executable software item;

downloading a second executable software item upon entry of the mobile terminal into a second location together with a trigger condition for deletion of the second executable software item;

monitoring for trigger data that satisfies the trigger condition for deletion of the second executable software item; and

deleting the second executable software item upon detection of trigger data that satisfies the trigger condition for deletion of the second executable software item.

38. The method of claim 37 wherein the mobile terminal is a mobile telephone or a mobile handset.

39. The method of claim 37 wherein monitoring for trigger data that satisfies the trigger condition for deletion of the second executable software item and deletion of the second executable software item are performed by the first executable software item.

40. The method of claim 37 further comprising: upon departure of the mobile terminal from the second location, the first executable software item deleting the second executable software item.

41. The method of claim 37 further comprising: upon deletion of the second executable software item, the first executable software item deleting itself.

42. The method of claim 37 further comprising: upon departure of the mobile terminal from the first location, the first executable software item deleting itself.

43. The method of claim 37 wherein the second location is different than the first location.

44. The method of claim 37 further comprising: the first executable software item downloading the second executable software item based on a context of the user.

45. The method of claim 44 wherein the user's context comprises user data.

46. The method of claim 45 wherein the user data comprises one or more of user profile data, calendar data, intentions data and notes data.

47. The method of claim 37 further comprising: the first executable software item downloading the second executable software item based on capabilities of the mobile terminal.

48. The method of claim 37 further comprising: the first executable software item advising the user that the second executable software item is available for downloading to the mobile terminal.

49. A mobile terminal, comprising:
 a memory device for storing a program; and
 a processor in communication with the memory device,
 the processor operative with the program to:
 download over a wireless connection an executable 5
 software item comprising a condition for deletion of
 the executable software item, wherein the executable
 software item enables access over a short range
 wireless connection to information concerning at
 least one of goods or services when the mobile 10
 terminal is within a specified location associated
 with a short range wireless system;
 store the executable software item comprising the con-
 dition for deletion of the executable software item in
 storage of the mobile terminal; and 15
 if the condition for deletion of the executable software
 item is satisfied, delete the executable software item
 from storage of the mobile terminal.

50. The apparatus of claim 49, wherein the processor is
 further operative with the program to: 20
 activate execution of the downloaded executable software
 item at the specified location for accessing the at least
 one of goods or services.

51. The method of claim 49, wherein the condition for
 deletion of the executable software item comprises that the 25
 mobile terminal has departed or is about to depart from the
 specified location associated with the short range wireless
 system.

52. A mobile terminal, comprising:
 a memory device for storing a program; and 30
 a processor in communication with the memory device,
 the processor operative with the program to:
 download over a wireless connection an executable
 software item together with trigger conditions for 35
 activation and deletion of the executable software
 item, wherein the executable software item enables
 access over a short range wireless connection to
 information concerning at least one of goods or
 services when the mobile terminal is within a speci- 40
 fied location associated with a short range wireless
 system;
 store the executable software item together with the
 trigger conditions for activation and deletion of the
 executable software item in storage of the mobile 45
 terminal;
 if a trigger condition for activation of the executable
 software item is satisfied, activate the executable
 software item; and
 if a trigger condition for deletion of the executable
 software item is satisfied, delete the executable soft- 50
 ware item from storage of the mobile terminal.

53. The method of claim 52, wherein the trigger condition
 for deletion of the executable software item comprises that
 the mobile terminal has departed or is about to depart from
 the specified location associated with the short range wire- 55
 less system.

54. A mobile terminal, comprising:
 a memory device for storing a program; and
 a processor in communication with the memory device,
 the processor operative with the program to:

download a first executable software item upon entry of
 the mobile terminal into a first location together with
 a trigger condition for deletion of the first executable
 software item;
 download a second executable software item upon
 entry of the mobile terminal into a second location
 together with a trigger condition for deletion of the
 second executable software item;
 monitor for trigger data that satisfies the trigger con-
 dition for deletion of the second executable software
 item; and
 delete the second executable software item upon detec-
 tion of trigger data that satisfies the trigger condition
 for deletion of the second executable software item.

55. A mobile terminal, comprising:
 a memory device for storing a program; and
 a processor in communication with the memory device,
 the processor operative with the program to:
 download an executable software item upon entry of the
 mobile terminal into a location associated with a short
 range wireless system;
 store the executable software item in memory;
 detect that the mobile terminal has departed or is about to
 depart from the location associated with the short range
 wireless system; and
 in response to detecting that the mobile terminal has
 departed or is about to depart from the location asso-
 ciated with the short range wireless system, delete the
 executable software item from memory.

56. A method for a mobile terminal, comprising:
 downloading an executable software item upon entry of
 the mobile terminal into a location associated with a
 short range wireless system;
 storing the executable software item in memory;
 detecting that the mobile terminal has departed or is about
 to depart from the location associated with the short
 range wireless system; and
 in response to detecting that the mobile terminal has
 departed or is about to depart from the location asso-
 ciated with the short range wireless system, deleting the
 executable software item from memory.

57. A computer readable medium having computer
 executable program code recorded thereon, which, when
 executed, causes a computer to:
 download an executable software item upon entry of the
 mobile terminal into a location associated with a short
 range wireless system;
 store the executable software item in memory;
 detect that the mobile terminal has departed or is about to
 depart from the location associated with the short range
 wireless system; and
 in response to detecting that the mobile terminal has
 departed or is about to depart from the location asso-
 ciated with the short range wireless system, delete the
 executable software item from memory.

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

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APPLICATION NO. : 11/143314
DATED : October 31, 2006
INVENTOR(S) : Marko Vanska, Sami Ranta and Raimo Malila

Page 1 of 1

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Column 17, line 19: please delete "apparatus" and replace it with -- mobile terminal --;

Column 17, line 24: please delete "method" and replace it with -- mobile terminal --;

Column 17, line 52: please delete "method" and replace it with -- mobile terminal --.

Signed and Sealed this

First Day of July, 2008

A handwritten signature in black ink, appearing to read "Jon W. Dudas". The signature is stylized with a large, looping initial "J" and a distinct "D".

JON W. DUDAS
Director of the United States Patent and Trademark Office